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Lithology, geochemistry, and aspects of separation of the Kogalym Member within the Lower Vasyugan Subhorizon (Upper Bathonian–Lowermost Oxfordian) of West Siberia

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Abstract

It is proposed to separate a regionally persistent member of fine-dispersed mudstones as the individual Kogalym Member within the Lower Vasyugan Subhorizon (Uppermost Bathonian–Lowermost Oxfordian). We present data on the lithologic composition, geophysical characteristics, and geochemical properties of the organic matter and depositional environments of the member. The Tyumenskaya SG-6 well is proposed as a type section of the Kogalym Member, where a biostratigraphic approach has yielded the Middle–Upper Callovian volume of the member. We also discuss the aspects of specification and detalization of the Callovain–Oxfordian part of the Callovian and Upper Jurassic regional scheme of West Siberia.

Keywords: lithology; regional stratigraphy; Callovian; Oxfordian; Vasyugan Horizon; geochemical composition of organic matter; West Siberia

Introduction

A Callovian–Late Jurassic stage of development of the sedimentary basins of the Boreal Belt is characterized by fundamental landscape alterations associated with large transgressions and significant redistribution of marine and terrestrial sedimentation areas (Devyatov et al., 2005; Kontorovich et al., 2013; Nesterov, 1976a; and others). Elucidation of the causes, factors and regularities of the alterations is critical for understanding of the sedimentary basins evolution and for revealing regularities of distribution of mineral resources, and is based on complex detailed investigation of deposits formed at this age.

Experts in various fields have been greatly interested in studying the Callovian–Oxfordian deposits of West Siberia for more than half of a century. Occurrence of J_1 oil-and-gas bearing horizon in these deposits predetermined high core-definition of this interval of the section. However, despite the good exploration maturity of the deposits, many questions of their structure, composition and depositional environments remain debatable.

The Callovian–Oxfordian deposits of the West Siberian sedimentary basin are combined in the Vasyugan Horizon (Gurari, 2004). In accordance with the most widely accepted concept, their distinct assignment in the Jurassic section is caused by a large marine transgression that took place in the terminal Bathonian. The terrestrial sedimentation area drastically migrated southward and southeastward in the Late Bathonian–Callovian. Evaluating the entire Jurassic Period, the expansion of marine sedimentation area makes the Callovian transgression the major event, and measuring absolute values of the area of the Callovian basin was the biggest after a Kimmeridgian–Volgian, when deposition of the Bazhenovo and Georgievka Formations and their stratigraphic counterparts took place.

Marine formations (Vasyugan, Abalak, Tochino, Sigovaya (the lower member), and Danilov are the most territorially abundant in the Vasyugan Horizon. The Vasyugan Formation is subdivided into lower and upper members (Fig. 1). The

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